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10/815,335	04/01/2004	Richard W. Citta	P01,0447-02	7549

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EXAMINER	
SINGH, HIRDEPAL	
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2611	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/815,335	CITTA ET AL.
	Examiner	**Art Unit**
	HIRDEPAL SINGH	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *60-84* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *60-84* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's arguments regarding 35 USC 103 (a) rejection as being unpatentable over Khayrallah et al. (US 6,320,919) in view of Yagyu (US 6,591,390) are persuasive. Therefore, the finality of the last office action is withdrawn.

Response to Arguments

2. Applicant's arguments with respect to claims 60-84 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 60-72 and 79-84 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. Independent claims 60 and 79 have a limitation "decoding the code vector, wherein the decoding includes deriving a constellation of received signal values corresponding to the code vector". This limitation (deriving a constellation of received signal values corresponding to the code vector) is not part of the original disclosure

(including the originally filed claims) of the current Application # 10/815,335 nor is part of the parent Application # 09/572,122 to which it is claiming priority. The specification of either of the applications has no support for the above limitation. Therefore, this raises an issue of new matter.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 60-66, 68 and 79-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (US 2007/0177697) in view of Molnar (US 6,567,481).

Regarding claims 60 and 79:

Calderbank discloses a method and system for decoding a received signal:

receiving a signal (receiving signal r in paragraph 0018) containing a code vector (a code vector is defined with received signal, and paragraph 0020 shows a modified received code vector);

decoding the code vector (paragraph 0010), wherein the decoding includes deriving a constellation (paragraph 0020) of received signal values corresponding to the code vector.

Calderbank discloses all of the subject matter as described above and further discloses soft decisions are made about the signals (abstract; paragraph 0032) i.e. a reliability of the received signal is measured, however to clearly show this limitation in the rejection another reference is brought in.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where generating a reliability factor based upon at least one of the received signal values (soft detection of symbol for the bit probability, see column 4, lines 35-42; column 9, lines 48-67, is same as measuring the reliability), wherein the reliability factor is a measure of reliability of the decoding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation until a convergence within a predetermined range that provide better performance with less complexity.

Regarding claim 61:

Calderbank discloses all of the subject matter as described above except for specifically teaching controlling an equalizer in accordance with the reliability factor.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where controlling an equalizer in accordance with the reliability factor (abstract, new estimates are calculated using the previous ones is checking the reliability).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claims 62 and 80:

Calderbank discloses all of the subject matter as described above except for specifically teaching one of the values of the signal is largest .

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where one of the values of the signal is largest (column 9, lines 22-41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claims 63 and 81:

Calderbank discloses all of the subject matter as described above except for specifically teaching the reliability is generated from the difference between two of received signal values.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where reliability is generated from the difference between two of received signal values. (column 7, lines 30-38; column 8, lines 50-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claims 64 and 82:

Calderbank discloses all of the subject matter as described above except for specifically teaching the reliability is generated from the difference between largest and next to largest of received signal values.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where reliability is generated from the

difference between two of received signal values (column 7, lines 30-38; column 8, lines 50-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor in the Calderbank system based on difference between largest and next to largest of received signal values to make an improved equalizer system for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claim 65:

Calderbank discloses all of the subject matter as described above except for specifically teaching controlling equalizer in accordance with reliability factor.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where controlling equalizer in accordance with reliability factor (abstract, new estimates are calculated using the previous ones is checking the reliability).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor in the Calderbank system based on difference between largest and next to largest of received signal values to make an improved equalizer system for better reception and repeat the estimation to check the performance of the system related to the in coming signal

whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claims 66 and 83:

Calderbank discloses all of the subject matter as described above except for specifically teaching generating reliability based on a comparison of the one received signal value to a threshold.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where generating reliability based on a comparison of the one received signal value to a threshold (column 3, lines 35-41; clearly stated in claim 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor in the Calderbank system based on difference between largest and next to largest of received signal values to make an improved equalizer system for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claim 68:

Calderbank discloses all of the subject matter as described above except for specifically teaching that the received signal symbol is adjusted according to the error or reliable signal until it converges to a predetermined threshold.

Molnar discloses a similar method and receiver for data detection where the received signal symbol is adjusted according to the error or reliable signal until it converges to a predetermined threshold (column 3, lines 28-41) i.e. the received signal is compared to a threshold, but does not explicitly disclose that the reliable signal is generated if the received signal value is greater than the threshold. However, this is just a variation of comparison between the received signal value and the threshold to generate the reliable signal, as threshold is greater than or less than or equal to the received signal value.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit.

8. Claims 67, 69-72 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (US 2007/0177697) in view of Molnar (US 6,567,481) as applied to claims 60 and 79 above, and further in view of Khayrallah et al. (US 6,320,919).

Regarding claim 67:

Calderbank discloses all of the subject matter as described above except for specifically teaching that the received signal value is largest one of received signal values.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the received signal value is largest one of received signal values (column 13, lines 19-26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit to make an improved equalizer system for better reception.

Regarding claim 69:

Calderbank discloses all of the subject matter as described above except for specifically teaching the generated reliability signal/factor is dependent on the magnitude of one received signal value.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the generated reliability signal/factor is dependent on the magnitude of one received signal value (column 13, lines 1-26).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or

interference level is under a limit to make an improved equalizer system for better reception.

Regarding claim 70:

Calderbank discloses all of the subject matter as described above except for specifically teaching that the received signal values are provided to correlation estimator for estimating interference.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the generated reliability signal/factor is dependent on the magnitude of one received signal value (column 7, lines 38-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit to make an improved equalizer system for better reception.

Regarding claims 71 and 84:

Calderbank discloses all of the subject matter as described above except for specifically teaching that the reliable or error signal/factor is generated based on the difference between square of received signal value.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the reliable or error signal/factor is generated based on the difference between square of received signal values (column 11, lines 1-12).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit to make an improved equalizer system for better reception.

Regarding claim 72:

Calderbank discloses all of the subject matter as described above except for specifically teaching the reliability factor is generated is based on the difference between square of largest and next to largest values of received signal.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the reliable factor is generated is based on the difference between square of largest and next to largest values of received signal (column 13, lines 1-26).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor based on different parameters such as coefficients of tap values and signal to noise ratio including the square of largest value and based on the difference between square of largest and next to largest value in the received signal to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit to make an improved equalizer system for better reception.

9. Claims 73-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (US 2007/0177697) in view of Molnar (US 6,567,481) further in view of Popovic (US 6,804,307).

Regarding claim 73:

Calderbank discloses a method and system for decoding a received signal:

receiving a signal (receiving signal r in paragraph 0018) containing a code vector (a code vector is defined with received signal, and paragraph 0020 shows a modified received code vector).

Calderbank discloses all of the subject matter as described above, and further discloses soft decisions are made about the signals (abstract; paragraph 0032) i.e. a reliability of the received signal is measured, however to clearly show this limitation in the rejection another reference is brought in, except that, decoding the code vector wherein the decoding includes correlating the received code vector with a plurality of reference code vectors so as to produce a plurality of values, and wherein the values correspond to and amount of correlation between the received code vector and the reference code vectors.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where generating a reliability factor based upon at least one of the received signal values (soft detection of symbol for the bit probability, see column 4, lines 35-42; column 9, lines 48-67, is same as measuring the reliability), wherein the reliability factor is a measure of reliability of the decoding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation until a convergence within a predetermined range that provide better performance with less complexity.

Popovic in the same field of endeavor discloses a method and receiver for data detection where the decoding the code vector (column 3, lines 20-28) wherein the decoding includes correlating (column 4, lines 16-36) the received code vector with a plurality of reference code vectors so as to produce a plurality of values, and wherein the values correspond to and amount of correlation between the received code vector and the reference code vectors (column 6, lines 58-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Popovic to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved system in the detector to calculate bit probability or reliability on previous estimates for better reception and repeat the estimation until a convergence within a predetermined range that provide better performance with less complexity also make the system range linear.

Regarding claim 74:

Calderbank discloses all of the subject matter as described above except for specifically teaching one of the values of the signal is largest .

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where one of the values of the signal is largest (column 9, lines 22-41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claim 75:

Calderbank discloses all of the subject matter as described above except for specifically teaching the reliability is generated from the difference between two of received signal values.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where reliability is generated from the difference between two of received signal values. (column 7, lines 30-38; column 8, lines 50-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor to measure reliability of signal detection in the Calderbank system to make an improved equalizer

system in the detector to advantageously calculate bit probability on previous estimates for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claim 76:

Calderbank discloses all of the subject matter as described above except for specifically teaching the reliability is generated from the difference between largest and next to largest of received signal values.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where reliability is generated from the difference between two of received signal values (column 7, lines 30-38; column 8, lines 50-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor in the Calderbank system based on difference between largest and next to largest of received signal values to make an improved equalizer system for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

Regarding claim 77:

Calderbank discloses all of the subject matter as described above except for specifically teaching generating reliability based on a comparison of the one received signal value to a threshold.

Molnar in the same field of endeavor discloses a system and method for iterative maximum a posteriori MAP detection in receiver where generating reliability based on a comparison of the one received signal value to a threshold (column 3, lines 35-41; clearly stated in claim 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use teachings of Molnar to generate a reliability factor in the Calderbank system based on difference between largest and next to largest of received signal values to make an improved equalizer system for better reception and repeat the estimation to check the performance of the system related to the in coming signal whether the system is performing the required operation to get back the information reliably, by using a code vector at the receiver to use the same decoding technique as use at the transmitter to encode the signal.

10. Claim 78 is rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (US 2007/0177697) in view of Molnar (US 6,567,481) further in view of Popovic (US 6,804,307) as applied to claim 73 above, and further in view of Khayrallah et al. (US 6,320,919).

Regarding claim 78:

Calderbank discloses all of the subject matter as described above except for specifically teaching that the reliable or error signal/factor is generated based on the difference between square of received signal value.

Khayrallah in the same field of endeavor discloses a method and receiver for data detection where the reliable or error signal/factor is generated based on the difference between square of received signal values (column 11, lines 1-12).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a reliable signal/factor if the compared received signal value is greater than the threshold to generate the reliable signal/factor if the received signal value is greater than threshold to make sure the noise or interference level is under a limit to make an improved equalizer system for better reception.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIRDEPAL SINGH whose telephone number is (571)270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off)8:00AM-5:00PMEST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. S./
Examiner, Art Unit 2611
April 30, 2008
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611